

Feasibility study of variable fan nozzle by means of warped chevrons

If the engine fan diameter can be reduced while maintaining thrust levels at crucial flight segments, the cost of producing an engine, and hence an overall aircraft, can be reduced. Collateral benefits include weight reduction of the engine and potential weight reduction of the nacelle and airframe as well as the reduced nacelle drag in cruise. This will result in fuel consumption reductions and reduced pollutant emissions.

Variation of the bypass nozzle exit area enables optimization of the turbofan engine operating cycle over a wider range of operational conditions resulting in improved thrust and/or fuel consumption. Further to the IMechE award winning research (Kenneth Harris James Prize 2010 and The George Stephenson Research Prize 2010), a feasibility study is proposed.

Based on the outcomes of the chevron nozzle (nearly 2 % maximum thrust improvement over the translating nozzle technique) the aim of the project is to study the feasibility of chevron nozzle by creating an innovative design of the chevron nozzle and then virtually verify the design using Finite Element Modelling (FEM).

This project will suit Engineering, graduate who is interested in creative design and computational modelling. Some experience in Engineering design and FEM is desirable but not essential.

1. B. Sloan, **J. Wang**, S. Spence, S. Raghunathan and D. Riordan, "Aerodynamic performance of bypass engine with nozzle exit area change by warped chevrons", Proceedings of the Institution of Mechanical Engineers, Part G, Journal of Aerospace Engineering, 0954-4100 (Print) 2041-3025 (Online), Volume 224, Number 6 / 2010 pp 731-743,
2. B. Sloan, J. Wang, S. Spence, and S. Raghunathan, "Parametric analysis of Variable nacelle nozzle throat area using warped chevrons", Proceedings of GT2008 ASME Turbo Expo 2008: Gas Turbine Technical Congress & Exposition June 9-13, 2008, Berlin, Germany
3. B. Sloan, **J. Wang**, S. Raghunathan, E. Benard, R. Cooper and S. Spence, "Performance and Acoustic Optimisation of Nacelle Nozzle Throat Area", 18 - 20 Sep 2007, 7th AIAA Aviation Technology, Integration and Operations Conference (ATIO), Belfast

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